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Trajectories of Aggressive Behavior and Children's Social-cognitive Development

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Abstract

The current study investigated developmental trajectories of teacher-reported aggressive behavior and whether these trajectories are associated with social-cognitive development (i.e., aggressive problem-solving) across the first three elementary grades in a large sample from Switzerland (N = 1,146). Semiparametric group-based analyses were employed to identify distinct pathways of aggressive behavior across grades. Five distinct trajectory classes were identified: low-stable, medium-stable, decreasing, increasing, and high-stable. Children's aggressive problem-solving strategies differentiated the high-stable from the other aggressive behavior trajectories. The findings are discussed within a social-cognitive developmental framework.

Keywords: Aggressive behavior, developmental trajectories, social-cognitive development, childhood

Trajectories of Aggressive Behavior and Children's Social-cognitive Development

Persistent aggressive behavior in childhood is one of the most serious risk factors for adolescent delinquency (Farrington, 1993). This being the case, an understanding of the risk and protective factors underlying changes in aggressive behavior can facilitate developmentally appropriate prevention programs. In this study, we investigated whether and how strategies of social problem-solving are associated with development of aggression during elementary school. Based on social-cognitive theory (Crick & Dodge, 1994; Lemerise & Arsenio, 2000), we suggest that cognitions such as those necessary for social problem-solving strategies are important factors in the subsequent development of aggressive behavior because, depending on the level of social-cognitive functioning, they can either buffer children from or exacerbate that behavior. According to the social information processing (SIP) model, children's social-cognitive interpretations of social events influence their behavioral responses. SIP theory describes a series of steps through which social information is processed and social behavior is instigated (Crick & Dodge, 1994). These steps include encoding, making attributions, selecting goals, generating potential responses, evaluating these responses, and decision making. All of these steps are influenced by earlier social interactions. However, there is comparatively little information about whether and how children's thinking about conflict situations impacts the development of future aggressive behavior. Moreover, the longitudinal studies that have been undertaken were limited predominantly to samples from the US. In this study, we aimed to partly fill this research gap by investigating whether children's social problem-solving strategies affect the trajectory of their aggressive behavior, using a large and ethnically diverse longitudinal sample from Switzerland.

Developmental Trajectories of Aggression

Aggression is generally defined as behavior meant to harm others (Achenbach, Conners, Quay, Verhulst, & Howell, 1989). Longitudinal studies indicate that early childhood aggressive behavior predicts externalizing behavior in middle childhood, adolescence, and adulthood (e.g., Brook, Whiteman, Finch, & Cohen, 1996). Researchers have examined the developmental trajectories of two forms of aggressive behaviors in children: bullying and physical aggression (e.g., Brame, Nagin, & Tremblay, 2001; Broidy et al., 2003; Maughan, Pickles, Rowe, Costello, & Angold, 2000; Pepler, Jiang, Craig, & Connolly, 2008). Most researchers using developmental trajectory analysis have identified two to five distinct groups of children within their samples; typically, one or two of these groups do not demonstrate serious aggressive behavior and are not at increased risk for later criminal behavior (e.g., Nagin & Tremblay, 1999). Among the remaining children, there are usually some who maintain consistently high levels of aggressive behaviors throughout development and others whose aggressive behavior is at a high level initially but decreases over time. Other researchers have identified yet another group of children whose aggressive behavior starts out low but increases through elementary and middle school (Schaeffer, Petras, Ialongo, Poduska, & Kellam, 2003).

Social-cognitive Development and Aggression Trajectories

To date, there have only been few large-scale longitudinal studies investigating whether children's social problem-solving strategies in conflict situations are associated with aggressive behavior over time.

Interestingly, whereas some researchers have found that aggressive children have difficulties at each of the steps within the social information processing model (e.g.,

Crane-Ross, Tisak, & Tisak, 1998; Crick & Werner, 1998; Dodge, Price, Bachorowski, & Newman, 1990; Egan, Monson, & Perry, 1998; Orobio de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002), other researchers have argued that specific forms of aggression such as bullying may not always be associated with deficits in social-cognitive understanding (Sutton, Smith, & Swettenham, 1999; Gasser & Keller, 2009).

Likewise, longitudinal studies on aggressive behavior and social-cognitive development have not revealed a completely consistent picture. Dodge, Greenberg, Malone, and the Conduct Problems Prevention Research Group (2008) tested a dynamic cascade model of the development of serious adolescent violence in 754 children. The level of social-cognitive development in the preschool years predicted aggressive and externalizing behavior in the first grade, which in turn predicted later school failure and violence in adolescence. Other longitudinal studies revealed that the association between social-cognitive development is not necessarily as straightforward but depends on other characteristics of the child. For example, in a longitudinal study of 189 third- through seventh-graders, it was found that although aggression-encouraging cognitions promoted aggression during the school year, the actual increase of aggressive behavior depended critically on the child's sex and initial level of aggression (Egan et al., 1998). Furthermore, in a recent 12-year longitudinal study using a community sample of 576 children tested first in kindergarten and then in Grades 3, 8, and 11, the researchers identified four group profiles: no SIP problems, early-stage SIP problems, later-stage SIP problems, and pervasive SIP problems. Although patterns in which these problems manifested were related to aggressive behavior in elementary school, the relation between social cognition and future externalizing behavior was stronger in Grades 8 and 11 than

in elementary school, suggesting that age functions as an important moderator (Lansford et al., 2006).

Given these inconsistencies, our primary objectives were to identify developmental trajectories of aggression across the first 3 years of elementary school and to investigate whether social problem-solving strategies would predict these trajectories. Based on past research, we expected to identify a group that was consistently low on aggression, a group that was consistently high on aggression, a group that was aggressive in the first year but later reduced their aggressive behavior, and a group that was less aggressive than other children in the first year but became more aggressive over time (cf. Campbell, Spieker, Burchinal, Poe, & the NICHD Early Child Care Research Network, 2006). In addition, we hypothesized that the children would demonstrate either increasing or consistently high levels of aggressive behavior if they also exhibited aggressive problem-solving strategies at the beginning of elementary school.

Method

Participants

The data were drawn from an ongoing combined longitudinal and intervention study, the Zurich Project on the Social Development of Children and Youth. The original sample consisted of a large, ethnically heterogeneous group of 7-year-olds drawn from all 90 public primary schools in the city of Zurich. The schools were classified by enrollment size and the socioeconomic background of the school district. Subsequently, a stratified sample of 56 schools was drawn (for a more detailed description, see Eisner & Ribeaud, 2005). Based on schools as the randomization units, two universal prevention programs were implemented (Eisner, Malti, & Ribeaud, in print).

The final sample consisted of 1,675 first graders (52% boys) from these 56 elementary schools. There were three main data collection waves that took place annually between 2004/5 and 2006/7. In each wave data was collected from the primary caregiver, the child, and the child's teacher. In the present study, we analyzed only the teacher and child data. At the first wave (T1), the mean age of the children at the child interview was 7.45 years (*SD* = 0.39). The response rate at T1 was 81% for both the child interviews (*N* = 1,361) and the teacher assessments (*N* = 1,350). For the second wave (T2), when the children were 8 years old, the retention rate was 97% for the child interviews and 96% for the teacher assessments; for the third wave (T3), when the children were 9 years old, the retention rate was 96% for the child interviews and 94% for the teacher assessments.

At T1, 78% of the children lived with their biological parents, 20% with their biological mother only, and 2% with their biological father only or with foster parents.

Measures

Aggressive behavior. The teachers evaluated the aggressive behavior of the children using the Social Behavior Questionnaire (SBQ; Tremblay et al., 1991). This instrument has been used in a variety of longitudinal studies and it has been shown to be sensitive to behavior changes in many intervention studies (e.g., Lacourse et al., 2002; Lösel, Beelmann, Stemmler, & Jaursch, 2006). The 11 items measure physical, proactive, and reactive aggression using a 5-point Likert scale (e.g., "is cruel, bullies or is mean to others"). The reliabilities (Cronbach's α) of the SBQ are .93 at T1, .93 at T2, and .93 at T3. The mean aggression levels on the SBQ were 0.59 (*SD* = 0.68, range 0 to 4.00) at T1, 0.55 (*SD* = 0.64, range 0 to 3.45) at T2, and 0.57 (*SD* = 0.64, range 0 to 3.55) at T3.

Social-cognitive development. The children's social problem-solving strategies were measured at T1 by having them respond to four hypothetical vignettes: playing on a swing, participating in a game, laughing at someone, and stealing a ball. These four scenarios, adapted from previous research (Crick & Dodge, 1996), were presented as three-frame sequences of gender-matched cartoons. For the first story, the child is read the following text:

> Pretend that this is you and that this is another child. The other child has been on the swing for a long time and doesn't seem to want to share the swing with you. You would really like to play on the swing.

Afterwards, the child is asked the following question: "What could you say or do so that you could play on the swing?" This question is the measure of the child's social problem-solving strategies. Responses to the question were audiotaped and later coded in the following categories: (a) aggressive strategy (e.g., "I'd just push him off the swing"), (b) socially competent strategy (e.g., "I'll ask to take turns"), and (c) other strategy (authority-oriented, irrelevant). For this study, we were specifically interested in the aggressive strategies. Two independent coders rated all the transcripts. Interrater agreement (Krippendorff's α) across the categories averaged at .79. Categorical answers were dichotomized and the matched pairs were averaged across both coders. A mean score for aggressive problem-solving strategies was then calculated. Across the entire sample, the mean level of aggressive problem-solving was 0.15 (SD = 0.20, range 0 to 1.00).

Demographic (control) variables. Sex was coded 1 for boys and 0 for girls (M = 0.51, SD = 0.50). Nationality was based on the caregivers' country of birth and assessed

only if both or a single caregiver was born outside Switzerland (coded 1 if yes and 0 if no; $M = 0.46$, $SD = 0.50$). Family stability was indicated by whether the children lived with their biological parents continuously since birth (coded 1 if yes and 0 if no; $M = 0.72$; $SD = 0.45$). Socioeconomic status (SES; $M = 48.48$, $SD = 19.57$) was based on coding the caregiver's current profession (Elias & Birch, 1994); the codes were then transformed into an International Socio-Economic Index of occupational status (ISEI) score (Ganzeboom, Degraaf, Treiman, & Deleeuw, 1992). The final SES score was based on the highest ISEI score of the two caregivers. Ethnicity, family stability, and SES were derived from the parent interviews. Because the sample size was lower for these interviews ($N = 1,225$) than for the teachers' interviews, there were missing values. After these data were removed, the final sample size of 1,146 was reached.

In order to test whether the receiving of prevention programs affected results, we performed additional analyses in which we included a dummy for the received intervention. Results were very similar.

Procedure

The parents were asked to sign an informed consent form at the beginning of the first interview. Computer-assisted 45-min interviews of the children were conducted at school by 44 interviewers who had been intensively trained by the research team, especially in techniques for interviewing children. Special care was taken to recruit native speakers or cross-culturally competent interviewers for the larger immigrant communities. The children completed the problem-solving strategy measure at T1. The demographic data were also collected at T1. The teachers completed a questionnaire on the child's social behavior at all three measurement times (T1–T3).

Data Analysis Strategy

Semiparametric group-based analyses were used to identify relatively homogeneous clusters of developmental trajectories within the sample (Nagin, 1999). The analyses proceeded in three steps: First, we identified the best fitting trajectory model for aggressive behavior using a SAS group-based modeling procedure (Jones & Nagin, 2007; Jones, Nagin, & Roeder, 2001). The censored normal model was used to account for cutting off at the lower bound of the aggression scale. In the second step, we added a multinomial logit model to examine whether the trajectory groups differed in aggressive problem-solving strategies. In the third step, the final model was identified by jointly estimating the trajectory parameters and the predicted probabilities of group membership (Nagin, 2005). Partial data on the trajectory variable (i.e., aggression) was allowed for in the analyses, but not missing data on the predictor variables.

Results

Trajectories of Aggressive Behavior

We estimated models for one to eight groups. The Bayesian Information Criterion (BIC) scores of the baseline first-order polynomial model (intercept + linear age) were inspected. BIC scores continued to improve as more groups were added. Because BIC scores are not useful for identifying the preferred number of groups in such cases, we determined the number of groups by identifying the model that was most parsimonious and that captured distinctive developmental patterns in the data (Nagin, 2005). The findings indicated that the five-group model is the most parsimonious and comprehensible, and adding more groups did not reveal other important features of the data. Quadratic orders were then added to the model and they improved the fit for three

of the groups. The mean assignment probabilities, used to evaluate the precision of the group assignments (Nagin, 1999), were good (0.81 to 0.94). The parameter estimates and mean assignment probabilities for the final model are shown in Table 1.

---- insert Table 1 ---

Figure 1 depicts the developmental aggression trajectories for the five-group model from the first to the third grade: The first group of children (35.2%, $n = 403$) were labeled low-stable because their aggression was consistently low over time; the second group (46.9%, $n = 538$), labeled medium-stable, showed somewhat elevated but stable aggressive behavior over time; the third group (6.7%, $n = 77$), labeled the increasing group, showed an increase in aggressive behavior over time; the fourth group (8.9%, $n = 102$), labeled the decreasing group, showed a decrease in aggressive behavior over time; the fifth group (2.3%, $n = 26$), labeled the high-stable group, showed a chronically high level of aggression. The observed scores were compared with the predicted scores, and the two sets of scores were found to be very similar.

--- insert figure 1 ---

Table 2 shows the total aggression scores split into the three subtypes, thus creating an "aggression profile" for each trajectory. As can be seen, all the groups had higher mean reactive aggression scores than mean physical and proactive aggression scores. However, as the total aggression scores increased from the low-stable to the medium-stable and high-stable group, the percentage of physical and proactive aggression in the total aggression score increased compared to the percentage of reactive aggression in the total aggression score.

-- insert table 2 ---

Links Between Aggressive Problem-solving Strategies and the Trajectories of Aggressive Behavior

The descriptive statistics for aggressive problem-solving strategies and demographics across the five trajectories are displayed in Table 3. Note that the low mean on aggressive problem-solving strategies for the increasing group is an artifact of missing data on the demographic variables, because this group had more missing data from the parent interviews than the other groups. When these control variables were removed, the mean on aggressive problem-solving strategies increased from 0.09 to 0.17, which is higher than the mean for the low-stable and medium-stable groups and comparable to that of the decreasing group.

--- insert table 3 ---

Multinomial logistic regression models were then used to examine whether the children with elevated scores on a covariate were overrepresented in specific aggression trajectories (Table 4). The high-stable group served as the reference group. All other groups have significantly lower scores on aggressive problem-solving than the high-stable group.[1]

--- insert table 4 ---

Pairwise comparisons of all the groups (e.g., low-stable versus medium-stable, medium-stable versus increasing) were then performed to test any additional differences in aggressive problem-solving strategies. Except for the contrasts involving the high-stable group, there were no significant differences.

Results on the demographic variables (see Table 4) show that members of the low-stable group were less likely to be male and more likely to be of high SES than

members of the high-stable group. Members of the low-stable, medium-stable, and increasing groups were more likely to come from stable families than members of the high-stable group.

Discussion

Drawing on social-cognitive theories (e.g. Crick & Dodge, 1994; Lemerise & Arsenio, 2000), we investigated if and how aggressive problem-solving strategies might predict aggressive behavior trajectories in children. We extended existing research by examining this question using a large and ethnically diverse longitudinal sample from Switzerland.

In accordance with previous trajectory research on aggression, we found that the majority of children scored consistently low- or medium-stable on aggressive behavior. We also identified a small group of children whose aggressive behavior decreased in aggression, a smaller group whose aggressive behavior increased, and an even smaller group that were observed to behave consistently high on aggression. These results are coherent with other studies that found only a small fraction of the children to be persistently aggressive (e.g., European Health Report, 2005; Malti & Noam, 2008; Pepler et al., 2008; Zwirs et al., 2007).

Our findings indicate that aggressive problem-solving strategies at the beginning of the first grade predicted trajectory group membership: Consistent with our hypotheses, the children in the high-stable group scored higher on aggressive problem-solving strategies than the children in the other groups. However, in contrast to our hypotheses, we did not find that membership in the increasing trajectory group was significantly associated with the presence of aggressive problem-solving strategies. Differences among

the low-stable, medium-stable, increasing, and decreasing groups on aggressive problem-solving strategies were not significant.

The finding that the children in the high-stable group scored higher on aggressive problem-solving strategies than the children in the other groups illustrates that deficits in competent problem-solving are specifically related to stable patterns of chronic aggressive behavior over time. Initially aggressive children who fail to develop nonaggressive problem-solving strategies are likely to remain aggressive over time. Hence, prevention efforts that focus on developing or enhancing the more functional problem-solving strategies may be useful for preventing persistent aggressive behavior.

We found that members of the increasing trajectory group did not show significantly higher levels of aggressive problem-solving than the other children at T1. Aggressive problem-solving scores for the increasing group were somewhat higher than for the low- and medium-stable groups, comparable to those of the decreasing group, and significantly lower than those of the high-stable group. This finding suggests that deficits in social problem-solving at T1 may be related to aggressive behavior at T1, but not to aggression later on. Hence, future research addressing the development of social problem-solving strategies over time in relation to the simultaneous development of aggression may be fruitful.

We also found that members of the various trajectory groups differed on demographic characteristics. Children in the high-stable group were more likely to be male, and have low SES than children in the low-stable trajectory group. They were also more likely to come from an unstable family than the low-stable, medium-stable, and increasing trajectory groups. This is in line with prior research on developmental

trajectories of aggression from childhood into adolescence (Maughan et al., 2000).

The trajectory groups differed not only in their problem-solving strategies and demographic characteristics, but also in the type of aggression they manifested. Although all groups reported more reactive aggression than proactive and physical aggression, the proportion of proactive and physical aggression compared to reactive aggression increased as total aggression increased from the low-stable to the medium-stable and high-stable groups. The types of aggression used by the children in the different trajectory groups are therefore quite different. Only 28% of total aggression among the children in the low-stable group was due to physical and proactive aggression, compared to 61% for the children in the high-stable group. However, 72% of total aggression among the children in the low-stable group was due to reactive aggression, compared to only 38% for the children in the high-stable group.

The present study was not without limitations. First, our overall measure of aggressive behavior did not differentiate between the subtypes of aggression (e.g., reactive, physical). This limitation is potentially consequential because different aggression subtypes may be associated with different social problem-solving strategies (e.g., Crick, Grotpeter, & Bigbee, 2002). Additionally, previous research has shown that different subtypes of aggression sometimes relate differently to social cognitions (e.g., Crick et al., 2002). Thus, it would be beneficial in future studies to investigate how different subtypes of aggressive behavior relate to differences in social problem-solving strategies over time. Finally, we did not investigate personality variables that might moderate the relationship between problem-solving strategies and aggressive behavior. Because research indicates that temperament variables such as impulsivity influence the

relation between aggression and social cognition (e.g., Fite, Goodnight, Bates, Dodge, & Pettit, 2008), future research may examine such moderators.

Despite these limitations, the findings provide new insights into how social problem-solving strategies in elementary school may be related to trajectories of aggressive behavior from the first grade to the third grade. Subsequent research investigating the link between social problem-solving strategies and long-term trajectories of aggressive behavior is thus recommended. This relationship is important, because identification of the risk and protective factors associated with social cognitions will provide useful input for the design of interventions aimed at preventing the development or persistence of aggression, thereby avoiding the long-term mental health consequences for aggressive children.

References

Achenbach, T.M., Conners, C.K., Quay, H.C., Verhulst, F.C., & Howell, C.T., (1989). Replication of empirically derived syndromes as a basis for taxonomy of child/adolescent psychopathology. *Journal of Abnormal Child Psychology, 17,* 299–323.

Brame, B., Nagin, D. S., & Tremblay, R. E. (2001). Developmental trajectories of physical aggression from school entry to late adolescence. *The Journal of Child Psychology and Psychiatry and Allied Disciplines*, *42*, 503–512.

Broidy, L. M., Nagin, D. S., Tremblay, R. E., Brame, B., Dodge, K., Fergusson, D., Horwood, J.L., Loeber, R., Laird, R., Lynam, D.R., Moffitt, T.E., Pettit, G.S., & Vitaro, F. (2003). Developmental trajectories of childhood disruptive behaviors

and adolescent delinquency: A six site, cross national study. *Developmental Psychology, 39,* 222–245.

Brook, J. S., Whiteman, M., Finch, S. J., & Cohen, P. (1996). Young adult drug use and delinquency: Childhood antecedents and adolescent mediators. *Journal of the American Academy of Child and Adolescent Psychiatry*, *35*, 1584–1592.

Campbell, S. B., Spieker, S., Burchinal, M., Poe, M., & the NICHD Early Child Care Research Network. (2006). Trajectories of aggression from toddlerhood to age 9 predict academic and social functioning through age 12. *Journal of Child Psychology and Psychiatry, 47*, 791–800.

Crane-Ross, D., Tisak, M. S., & Tisak, J. (1998). Aggression and conventional rule violation among adolescents: Social-reasoning predictors of social behaviour. *Aggressive Behavior, 24,* 347–365.

Crick, N.R., & Dodge, K.A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin, 115,* 74–101.

Crick, N. R., & Dodge, K. A. (1996). Social information-processing mechanisms in reactive and proactive aggression. *Child Development, 67*, 993–1002.

Crick, N.R., Grotpeter, J.K., & Bigbee, M.A. (2002). Relationally and physically aggressive children's intent attributions and feelings of distress for relational and instrumental peer provocations. *Child Development*, *73*, 1134–1142.

Crick, N. R., & Werner, N. E. (1998). Response decision processes in relational and overt aggression. *Child Development, 69*, 1630–1639.

Dodge, K.A., Greenberg, M.T., Malone, P.S., & Conduct Problems Prevention Research Group (2008). Testing an idealized dynamic cascade model of the development of serious violence in adolescence. *Child Development, 79*¸ 1907–1927.

Dodge, K. A., Price, J. M., Bachorowski, J. A., & Newman, J. P. (1990). Hostile attributional biases in severely aggressive adolescents. *Journal of Abnormal Psychology*, *99*, 385–392.

Egan, S.K., Monson, T.C., & Perry, D.G. (1998). Social-cognitive influences on change in aggression over time. *Developmental Psychology*, *34*, 996–1006.

Eisner, M., Malti, T., & Ribeaud, D. (in print). Large-scale criminological field experiments: The Zurich Project on the Social Development of Children. In S. Gadd, S. Karstedt, & S. Messner (Eds.), *Sage Handbook of Criminological Methods*.

Eisner, M., & Ribeaud, D. (2005). A randomized field experiment to prevent violence. *European Journal of Crime, Criminal Law and Criminal Justice*, *13*, 27–43.

Elias, P., & Birch, M. (1994). *Establishment of community-wide occupational statistics: ISCO 88 (COM) – A guide for users*. University of Warwick, Institute of Employment Research.

European Health Report (2005). *Public health action for healthier children and populations.* Geneva: WHO Regional Office for Europe. Retrieved August, 10, 2008, from http://www.euro.who.int/ehr2005

Farrington, D.P. (1993). Motivations for conduct disorder and delinquency. *Development and Psychopathology*, *5*, 225–241.

Fite, J.E., Goodnight, J.A., Bates, J.E., Dodge, K.A., & Pettit, G.S. (2008). Adolescent aggression and social cognition in the context of personality: Impulsivity as a moderator of predictions from social information processing. *Aggressive Behavior*, *34* , 511–520.

Ganzeboom, H. B. G., Degraaf, P. M., Treiman, D. J., & Deleeuw, J. (1992). A standard international socio-economic index of occupational status. *Social Science Research*, *21*, 1–56.

Gasser, L., & Keller, M. (2009). Are the competent the morally good? Perspective taking and moral motivation of children involved in bullying. *Social Development, 18*, 798–816.

Jones, B. L., & Nagin, D. S. (2007). Advances in Group-Based Trajectory Modeling and an SAS Procedure for Estimating Them. *Sociological Methods & Research, 35*, 542–571.

Jones, B. L., Nagin, D. S., & Roeder, K. (2001). A SAS procedure based on mixed models for estimating developmental trajectories. *Sociological Methods & Research*, *29*, 374–393.

Lacourse, E., Côté, S., Nagin, D. S., Vitaro, F., Brendgen, M., & Tremblay, R. E. (2002). A longitudinal-experimental approach to testing theories of antisocial behavior development. *Development and Psychopathology, 14*, 909–924.

Lansford, J.E., Malone, P.S., Dodge, K.A., Crozier, J.C., Pettit, G.S., & Bates, J.E. (2006). A 12-year prospective study of patterns of social information processing

problems and externalizing behaviors. *Journal of Abnormal Child Psychology, 34,* 715–724.

Lemerise, E., & Arsenio, W. (2000). An integrated model of emotion processes and cognition in social information processing. *Child Development, 71*, 107-118.

Lösel, F., Beelmann, A., Stemmler, M., & Jaursch, S. (2006). Prävention von Problemen des Sozialverhaltens im Vorschulalter: Evaluation des Eltern- und Kindertrainings EFFEKT [Preventing behavior problems in preschool-aged children: Evaluation of the parent- and child skills training EFFEKT]. *Zeitschrift für Klinische Psychologie und Psychotherapie, 35*, 127–139.

Malti, T., & Noam, G.G. (Eds.) (2008). Where youth development meets mental health and education: the RALLY approach. *New Directions for Youth Development, 120,* 1-188.

Maughan, B., Pickles, A., Rowe, R., Costello, E.J., & Angold, A. (2000). Developmental trajectories of aggressive and non-aggressive conduct problems. *Journal of Quantitative Criminology, 16,* 199–221.

Nagin, D. S. (1999). Analyzing developmental trajectories: A semiparametric, group-based approach. *Psychological Methods, 4*, 139–157.

Nagin, D. S. (2005). *Group-based modeling of development over the life course*. Cambridge, MA: Harvard University Press.

Nagin, D., & Tremblay, R. E. (1999). Trajectories of boys' physical aggression, opposition, and hyperactivity on the path to physically violent and non violent juvenile delinquency. *Child Development, 70,* 1181–1196.

Orobio de Castro, B., Veerman, J.W., Koops, W., Bosch, J.D., & Monshouwer, H.J. (2002). Hostile attribution of intent and aggressive behavior: A meta-analysis. *Child Development, 73,* 916–934.

Pepler, D., Jiang, D., Craig, W., & Connolly, J. (2008). The development of bullying. *International Journal of Adolescent Medicine and Health*, *20*, 113–119.

Schaeffer, C., Petras, H., Ialongo, N., Poduska, J., & Kellam, S. (2003). Modeling growth in boys' aggressive behavior across elementary school: Links to later criminal involvement, conduct disorder, and antisocial personality disorder. *Developmental Psychology*, *39*, 1020–1035.

Sutton, J., Smith P.K. & Swettenham, J. (1999). Social cognition and bullying: Social inadequacy or skilled manipulation? *British Journal of Developmental Psychology, 17,* 435–450.

Tremblay, R. E., Loeber, R., Gagnon, C., Charlebois, P., Larivee, S., & LeBlanc, M. (1991). Disruptive boys with stable and unstable high fighting behavior patterns during junior elementary school. *Journal of Abnormal Child Psychology, 19*, 285–300.

Zwirs, B. W. C., Burger, H., Schulpen, T. W. J., Wiznitzer, M., Fedder, H., & Buitelaar, J. K. (2007). Prevalence of psychiatric disorders among children of different ethnic origin. *Journal of Abnormal Child Psychology*, *35*, 556–566.

Footnotes

[1] In order to see whether another form of problem-solving predicted group membership, we performed additional analyses in which we analyzed the relationship between socially competent problem-solving and group membership. The relationship between competent problem-solving and aggressive problem-solving was very strong (r = -.68, $p < .001$). The relationship between socially competent problem-solving and group membership was similar but opposite to the relationship between aggressive problem-solving and group membership. However, the multinomial analyses yielded less significant results relative to the high-stable reference group in the case of socially competent problem-solving compared to aggressive problem-solving: Socially competent problem-solving differentiated the low-stable from the high-stable group ($\beta = 1.58$, $p <$ .05) and the medium-stable from the high-stable group ($\beta = 1.69$, $p < .05$), but did not differentiate the increasing group ($\beta = 1.74$, $p < .10$) or the decreasing group ($\beta = 1.38$, p >.10) from the high-stable group.

Table 1

Parameter Estimates and Model Characteristics for the Latent Class Analyses

	Trajectory Group				
	Low-stable	Medium-stable	Increasing	Decreasing	High-stable
Estimated model parameters					
Intercept	6.11*	3.73*	-1.60*	4.80**	25.84**
Age/10	-15.92*	-8.34*	3.62**	-4.21**	-59.05**
$(Age/10)^2$	9.95*	5.33*	-	-	36.93**
Model characteristics					
Mean assignment probability	0.88	0.87	0.81	0.82	0.94

Note. *$p < .05$. **$p < .01$.

Table 2

Mean Aggressive Behavior Scores From T1 to T3 (% of total aggression) by Trajectory Group

	Trajectory Group				
	Low-stable	Medium-stable	Increasing	Decreasing	High-stable
Reactive Aggression	0.18 (72)	1.02 (58)	1.79 (43)	2.09 (46)	2.90 (38)
Physical Aggression	0.02 (8)	0.38 (22)	1.27 (31)	1.36 (30)	2.46 (32)
Proactive Aggression	0.05 (20)	0.36 (20)	1.06 (26)	1.10 (24)	2.24 (29)
Total Aggression	0.25 (100)	1.76 (100)	4.12 (100)	4.55 (100)	7.60 (100)

Table 3

Means (SDs) for the Independent Variables Across Trajectory Groups (N =1,146)

	Trajectory Group				
	Low-stable	Medium-stable	Increasing	Decreasing	High-stable
Aggr. problem-solving	0.14 (0.21)	0.14 (0.19)	0.09 (0.14)	0.18 (0.21)	0.29 (0.25)
Control Variables					
Sex (male)	0.40 (0.49)	0.53 (0.50)	0.64 (0.48)	0.76 (0.43)	0.73 (0.45)
SES	53.95 (19.33)	46.54 (19.16)	39.55 (19.00)	45.45 (18.08)	41.23 (17.10)
Nationality (Swiss)	0.38 (0.49)	0.48 (0.50)	0.73 (0.45)	0.42 (0.50)	0.58 (0.50)
Family stability	0.81 (0.39)	0.74 (0.44)	0.77 (0.43)	0.55 (0.50)	0.42 (0.50)

Table 4

Multinomial Coefficients (SD) for the Multinomial Logit Model

	Trajectory Group			
	Low-stable	Medium-stable	Increasing	Decreasing
Aggr. problem-solving	-2.19* (.85)	-2.50** (.83)	-3.36** (1.22)	-2.03* (.98)
Control Variables				
Sex (male)	-1.40** (.50)	-0.85† (.49)	-0.26 (.58)	0.24 (.57)
SES	0.03* (.01)	0.01 (.01)	0.00 (.02)	0.01 (.01)
Nationality (Swiss)	-0.45 (.50)	-0.30 (.50)	0.33 (.62)	-0.43 (.56)
Family stability	1.71** (.47)	1.33** (.45)	1.25* (.61)	0.37 (.51)

Note. The high-stable group was the reference category.

†$p < .10$. * $p < .05$. ** $p < .01$.

Figure Caption

Figure 1. Fitted mean trajectories for teacher-reported aggressive behavior.